Period: Date: Name:

# Practice with Newton's Gravity

1. Identify the formula for the universal law of gravitation defining all variables with units:

"I'm warning you, Perkins - your flagrant disregard for the laws of physics will not be tolerated!"

2. In YOUR OWN WORDS describe how the force of gravity between two objects changes as the mass and separating distance changes.

3. Calculate the force of gravity between the planet Neptune and the Sun. Use appendix K from your textbook for the mass of the sun. Convert units as necessary.

1km = 1000m

$dist._{Nep\text{-}Sun} = 44.97 \times 10^{8} km$

$M_{Nep} = 1.03 \times 10^{26} kg$

4. Explain how your weight would change on the surface of the moon and why. How would your weight change if you were on the visible surface of Jupiter? Why?

5. Calculate your weight in pounds if you were on the planet Mercury. Express your weight in the pounds. Convert units as necessary.

$r_{Mercury} = 2.44 \times 10^{6} m$

$M_{Mercury} = 3.31 \times 10^{23} kg$

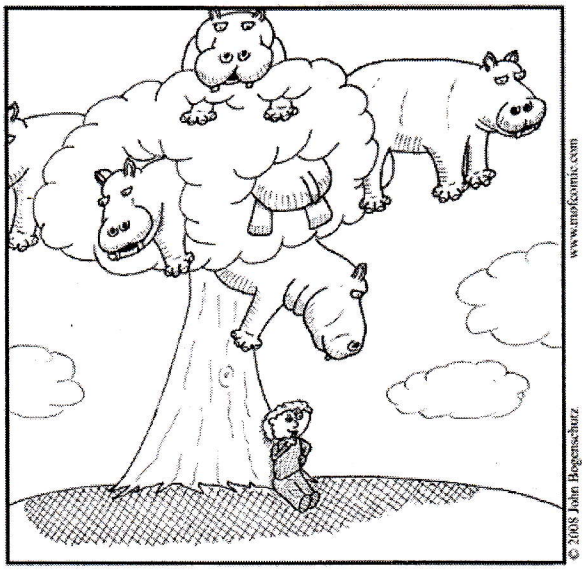
1 lbs. = .45kg

1 N = .22481 lbs.

6. Calculate the force of attraction in Newtons between you and a friend standing 5 meters apart! Convert units as necessary.
1 lbs. = .45kg
8. How would your answer to #6 change if you and your friend were floating together out in space?

9. Calculate the mass of the Earth, using your weight (expressed in Newtons and kilograms). (hint: algebra) Convert units as necessary. Check your answer with appendix K in the textbook.
1 lbs. = .45kg
$r_{Earth} = 6.37 \times 10^6 m$
1 lbs. = 4.45 N

10. To find the acceleration due to gravity, or 'g', use Newton's formula but only include the mass of whatever planet you are attempting to find 'g' for. Find the acceleration due to gravity for: Jupiter, Neptune, Mars, and Pluto! Use Newton's 2nd *(F = ma)* law of motion to figure out how much you would weigh on each of these planets.




It was, actually, under this hippo tree where Isaac Newton's fierce physicist rival, Bernard Johns, would soon *first* discover the theory of gravity.
*...however...*